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Parasitic Helminths [1] from Paraguay XV: Atractidae (Nematoda: Cosmocercoidea) from Frogs

by

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With 5 figures

ABSTRACT

Five atractid nematode parasites were recovered from frogs of Paraguay: *Schrankiana fuscus* n. sp. from *Leptodactylus fuscus; S. formosula* Freitas, 1959, from *Leptodactylus fuscus* and *L. elenae* (new host record); *S. larvata* (Vaz, 1933), *S. inconspicata* Freitas, 1959, and *S. brasili* (Travassos, 1927) from *Leptodactylus labyrinthicus. S. brasili* was also recovered from *Bufo paracnemis* (new host record), but this may have been an accidental infection. The genus *Schrankianella* Freitas, 1959 (*S. brasili* type and only species) is synonymized with *Schrankiana* Strand, 1942, because the oesophagus, although it is relatively elongate, does not differ morphologically from *Schrankiana* spp. Characters found to be particularly useful for distinguishing *Schrankiana* species include oesophageal shape, cephalic morphology, extent of the lateral alae, location of the vulva, size of the vagina, and rarely male caudal features (papillae, spicules, preanal musculature).

INTRODUCTION

The Atractidae parasitic in amphibians consist of only two genera (*Schrankiana* Strand, 1942 (five species) and *Schrankianella* Freitas, 1959 (one species)) parasitic in frogs of the genus *Leptodactylus* (Leptodactylidae) from South America. Published

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[1] CORRECTION: in our previous article on *Aplectana* in Paraguayan frogs (*Revue suisse Zool.* 93: 607-616) figures 1 and 3 were transposed.

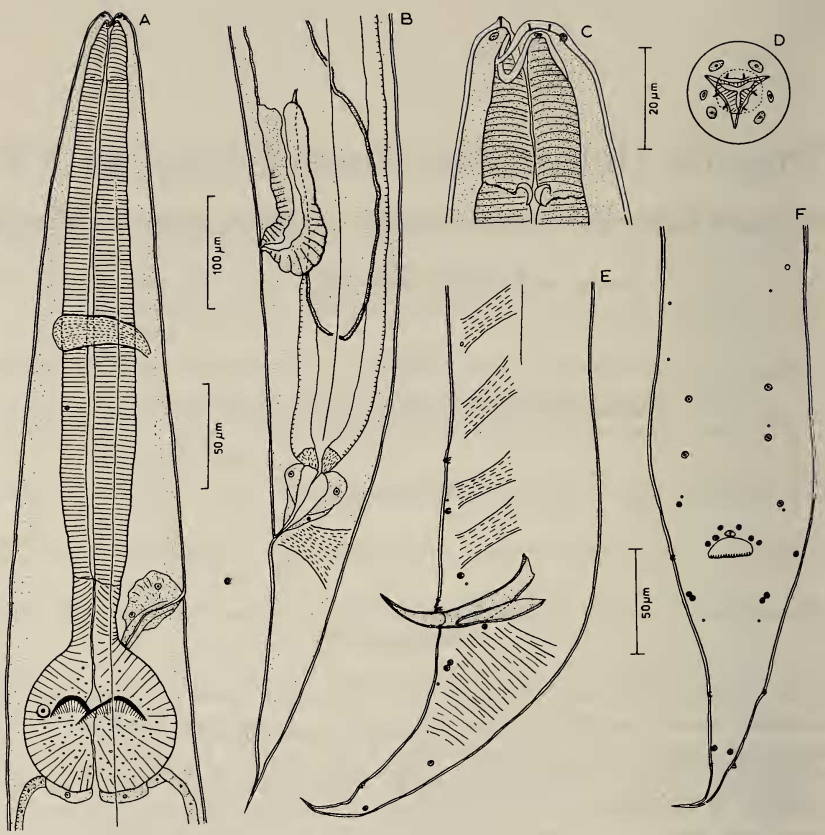

FIG. 1.

Schrankiana formosula Freitas, 1959. A, anterior end of female, lateral view. B, posterior end of female, lateral view. C, D, cephalic extremity, lateral and apical view. E, F, caudal end of male, lateral and ventral view.

records are from Brazil (TRAVASSOS 1925; VAZ 1933; FAHEL 1952; FREITAS 1959; GUIMARÃES *et al.* 1976; BAKER 1982) and Ecuador (DYER & ALTIG 1977). The present report, based on material collected in Paraguay during the Museum of Geneva expedition of 1979 (participants F. Baud, V. Mahnert, J.-L. Perret and C. Vaucher, Geneva; C. Dlouhy, Asuncion), extends the geographical range of the group and adds one new species and some new host records. In addition, *Schrankianella* is shown to be synonymous with *Schrankiana*. Redescriptions of species are provided because published descriptions do not accurately show the number and distribution of male caudal papillae, details of the cephalic extremity, or the internal anatomy of the oesophagus. These include important characters for distinguishing species.

DESCRIPTION OF SPECIES

Schrankiana formosula Freitas, 1959

Material examined: From *Leptodactylus fuscus,* 2 of 6 positive, MHNG field number *PY 425* (17♂, 20♀), *521* (9♂, 13♀); from *L. elenae,* 1 of 11 positive, *63* (13♂, 18♀).

New host record: *L. elenae.*

Localities and dates: Salto del Guaira (Canendiyu prov.), 31.X.1979; arroyo Itabo Guazu (Alto Parana prov.), 5.XI.1979; 10 km N Coronel Oviedo (Caaguazu prov.), 9.X.1979.

Registration numbers: MHNG 979.775-777.

Description (fig. 1): Narrow lateral alae present, extending from anterior third of oesophagus to position just anterior to anus in both sexes. Somatic papillae minute, distributed over body surface. Oral opening triangular, three relatively elongate lips present. Each lip with cuticular flange overhanging mouth opening. Cephalic extremity with six small labial papillae and four large outer papillae. Anterior extremity of oesophagus with three large and relatively elongate tooth-like projections. Oesophagus with relatively elongate and slender pharynx, relatively slender corpus, short isthmus, and well developed posterior bulb (bulb width about one fifth of total length of oesophagus).

Males: Caudal papillae distributed as follows: posterior half of tail with one pair lateral, one pair subventral and one pair of subdorsal papillae; anterior half of tail with two pairs of adjacent subventral papillae; anterior lip of anus with one large unpaired and three pairs of papillae; four or five pairs of subventral papillae (some individuals with four papillae on one side and five on the other) in two rows extending anteriorly from the level of the anus. Posterior edge of anus with cuticular comblike fringe. Four or five pairs of subventral caudal muscle cells located anterior to anal region. Spicules relatively short, curved ventrally, sharply pointed distally and with variably shaped capitulum. Gubernaculum conspicuous. Tail conical and sharply pointed.

Females: Monodelphic, 2-6 eggs or larvae in uterus. Vulva located just anterior to anus, vagina about 120-200 µm long. Some specimens with short posterior uterine pouch extending just posterior to vulva. Tail conical and sharply pointed.

Measurements: 5 males and 5 females from *L. fuscus* as follows: *Males* — total length 1.97-2.30 mm; oesophagus 404-428 µm long; nerve ring 150-166 µm and excretory pore 305-336 µm from anterior extremity; spicules 80-86 µm, gubernaculum 42-52 µm and tail 143-173 µm long. *Females* — total length 2.70-2.81 mm; oesophagus 483-513 µm long; nerve ring 186-219 µm and excretory pore 378-408 µm from anterior extremity; vulva 356-390 µm from posterior extremity; tail 164-179 µm long. 5 males and 5 females from *L. elenae* as follows: *Males* — total length 1.59-1.88 mm; oesophagus 375-422 µm long; nerve ring 132-178 µm and excretory pore 285-319 µm from anterior extremity; spicules 67-88 µm, gubernaculum 40-48 µm and tail 128-135 µm long. *Females* — total length 1.43-1.75 mm; oesophagus 377-440 µm long; nerve ring 165-180 µm and excretory pore 269-330 µm from anterior extremity; vulva 251-274 µm from posterior extremity; tail 126-134 µm long.

Discussion: *S. formosula* was described from *Leptodactylus fuscus* (= *L. typhonicus*) of Itaguai, Estado do Rio de Janeiro, Brazil (Freitas 1959). *L. fuscus* is widely distributed in South America east of the Andes Mountains and therefore the present report of *S. formosula* in this host from Paraguay is not surprising. Its occurrence in *L. elenae* from Paraguay represents a new host record. *L. elenae* is closely related to *L. fuscus;* both species belongs to the *fuscus* group of *Leptodactylus* species (Heyer 1978).

S. formosula is readily distinguished from *S. larvata* (Vaz, 1933) in possessing an oesophageal pharynx which is about twice as long as wide (length and width about equal in *S. larvata*). It differs from *S. inconspicata* Freitas, 1959, *S. schranki* (Travassos, 1925), *S. freitasi* Baker, 1982, in having a significantly shorter oesophagus with a relatively more robust bulb.

Schrankiana larvata (Vaz, 1933) Fahel, 1952

Material examined: From *Leptodactylus labyrinthicus,* 1 of 1 positive, MHNG field number *PY 77* (2♀, 12♂).

Locality and date: arroyo Azotey near Cororo (Concepcion prov.), 9.X.1979.

Registration number: MHNG 979.778.

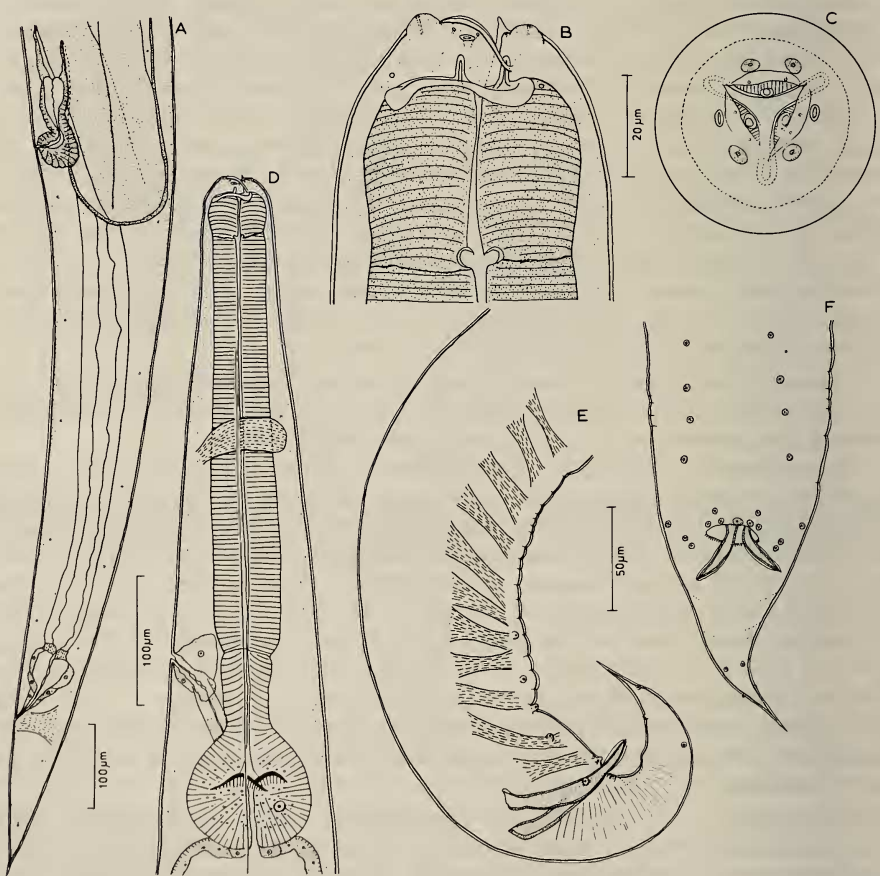

FIG. 2.

Schrankiana larvata Vaz, 1933. A, posterior end of female, lateral view. B, C, cephalic extremity, lateral and apical view. D, anterior end of female, lateral view. E, F, caudal end of male, lateral and ventral view.

D e s c r i p t i o n (fig. 2): Similar to *S. formosula* except in the following. Lateral alae terminating well anterior to anus in both sexes (about 500 µm from anus in males and 650 µm in females). Cephalic lips relatively short. Anterior extremity of oesophagus with three relatively small and elongate tooth-like projections. Pharyngeal portion of oesophagus of equal length and width. From 11-14 pairs of subventral caudal muscle cells located anterior to anus in males. Male tail relatively short. Measurements of 2 males and 5 females as follows: *Males* — total length 2.50-2.59 mm; oesophagus 420-449 µm long; nerve ring 166-172 µm and excretory pore 298-330 µm from anterior extremity; spicules 71-78 µm, gubernaculum 56-57 µm and tail 108-122 µm long. *Females* — total length 2.68-3.80 mm; oesophagus 467-537 µm long; nerve ring 190-213 µm and excretory pore 313-373 µm from anterior extremity; vulva 680-975 µm from posterior extremity; tail 187-211 µm long.

D i s c u s s i o n : *S. larvata* was described from *Leptodactylus pentadactylus* of Sao Paulo and Minas Gereis, Brazil. It has subsequently been reported in this same host, *L. fuscus* (= *L. sibilatrix*), and *L. labyrinthicus* of Sao Paulo, Bahia, Matto Grosso and Para, Brazil (FAHEL 1952; FREITAS 1959; GUIMARAES *et al.* 1976).

S. larvata is most readily distinguished from all other *Schrankiana* spp. except *S. fuscus* n. sp. (see below for diagnosis) by the shape of the pharyngeal portion of the oesophagus. In these two species this structure is markedly shortened so that its width and length are equal, whereas in other species it is relatively more elongate. A similar modification is observed in the cephalic lips which are relatively shorter than in other species.

Schrankiana inconspicata Freitas, 1959

Material examined: From *Leptodactylus labyrinthicus,* 1 of 1 positive, MHNG field number *PY 77* (12♂, >100♀).

Locality and date: arroyo Azotey near Cororo (Concepcion prov.), 9.X.1979.

Registration number: MHNG 979.779.

D e s c r i p t i o n (fig. 3): Similar to *S. formosula* except in the following. Lateral alae terminating well anterior to anus (about 260 µm) in males. Oesophageal corpus in anterior 30 µm amuscular and lumen thickly lined with cuticle. Oesophageal bulb relatively small (total length of oesophagus 8-9 times bulb width). In all male specimens 4 pairs of subventral caudal papillae (except the two adjacent pairs) extending in rows from anterior half of tail anteriorly. From 11-13 pairs of subventral caudal muscle cells located anterior to anus in males. Vagina relatively long, divided into *vagina vera* about 120 µm long and *vagina uterina* about 300 µm long. Measurements of 5 males and 5 females as follows: *Males* — total length 2.38-2.64 mm; oesophagus 589-630 µm long; nerve ring 213-230 µm and excretory pore 421-482 µm from anterior extremity; spicules 58-72 µm, gubernaculum 37-40 µm and tail 157-181 µm long. *Females* — total length 2.70-2.80 mm; oesophagus 587-682 µm long; nerve ring 204-219 µm and excretory pore 398-547 µm from anterior extremity; vulva 290-363 µm from posterior extremity; tail 168-190 µm long.

D i s c u s s i o n : *S. inconspicata* was described from *Leptodactylus labyrinthicus* and *L. pentadactylus* of the following states in Brazil: Bahia, Mato Grosso, Minas Gereis, Sao Paulo, Para. According to FREITAS (1959) the report by FAHEL (1952) of *Schrankiana schranki* in *Leptodactylus labyrinthicus* (= *L. pentadactylus labyrinthicus*) from Minas Gereis, Sao Paulo and Bahia, Brazil, is referable to *S. inconspicata.*

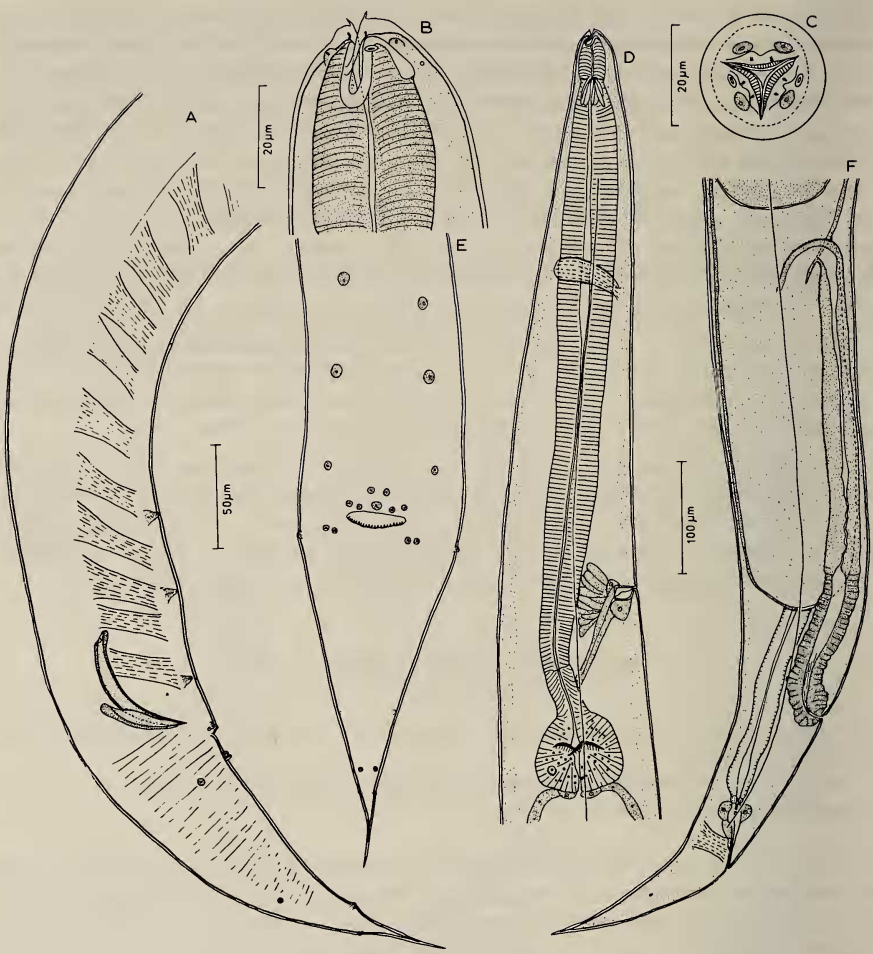

FIG. 3.

Schrankiana inconspicata Freitas, 1959. A, caudal end of male, lateral view. B, C, cephalic extremity, lateral and apical view. D, anterior end of female, lateral view. E, caudal end of male, ventral view. F, posterior end of female, lateral view.

On the basis of relative oesophagus length, *S. inconspicata* readily distinguished from all other species in the genus except *S. schranki* (Travassos, 1925) and *S. freitasi* Baker, 1982, both described from *Leptodactylus pentadactylus* of Brazil. It can be readily distinguished from *S. schranki* by spicule length. Thus in males of *S. schranki* which were 1.88-2.50 mm total length the spicules were 84-120 µm long (TRAVASSOS 1925, 1931; FREITAS 1959), whereas in males of *S. inconspicata* which were 1.85-2.64 µm total length the spicules were 58-72 µm long (FREITAS 1959; present study).

BAKER (1982) distinguished *S. freitasi* from *S. inconspicata* on the basis of supposed differences in the shape of the spicule capitulum. However, the present redescription

shows that this feature does not differ markedly in *S. inconspicata* from other species in the genus. Nevertheless, *S. inconspicata* can be distinguished from *S. freitasi* on the basis of the male caudal papillae and caudal musculature, the vagina, and the anterior portion of the oesophageal corpus. Whereas there are 4 pairs of subventral caudal papillae (except the two adjacent pairs) extending in rows from the anterior half of the tail anteriorly in *S. inconspicata,* there are 5 pairs in *S. freitasi.* The male subventral preanal caudal musculature consists of 5 pairs of cells in *S. freitasi* and from 11-13 pairs in *S. inconspicata.* The vagina is relatively longer in *S. inconspicata* (420 μm) than in *S. freitasi* (300 μm) of comparable body size. *S. inconspicata* differs from all other *Schrankiana* spp. in an unusual modification of the anterior end of the oesophageal corpus: for a distance of about 30 μm posterior to the pharynx the corpus wall is relatively devoid of muscular tissue and the lumen lining is expanded and appears to include cuticular rod-shaped structures.

Schrankiana brasili (Travassos, 1927) Fahel, 1952

New synonym: *Schrankianella brasili* (Travassos, 1927) Freitas, 1959.

Material examined: From *Leptodactylus labyrinthicus,* 1 of 1 positive, MHNG field number *PY 77* (15♂, 69♀); from *Bufo paracnemis,* 1 of 9 positive, *PY 532* (1♂).

New host record: *Bufo paracnemis.*

Localities and dates: arroyo Azotey near Cororo (Concepcion prov.), 9.X.1979; arroyo Itabo Guazu (Alto Parana prov.), 5.XI.1979.

Registration numbers: MHNG 979.780-781.

Description (fig. 4): Similar to *S. formosula* except in the following. Body size markedly larger. Lateral alae narrow, extending from middle of pharyngeal portion of oesophagus to end of oesophagus in both sexes. Oesophagus with markedly elongate pharyngeal portion and corpus, relatively short isthmus, and relatively small posterior bulb (bulb width about 6% of total length of oesophagus). From 17-19 pairs of subventral caudal muscle cells located anterior to anus in males. Vagina markedly elongate, divided into *vagina vera* about 200 μm long, and *vagina uterina* about 1.3 mm long. *Vagina uterina* directed anteriorly in first half, posteriorly in second half, and flexed at distal end to join anteriorly directed uterus. Measurements of 5 males and 5 females as follows: *Males* — total length 5.20-6.40 mm; oesophagus 1235-1470 μm long; nerve ring 350-372 μm and excretory pore 820-938 μm from anterior extremity; spicules 76-83 μm, gubernaculum 57-63 μm and tail 247-329 μm long. *Females* — total length 6.82-7.32 mm; oesophagus 1455-1580 μm long; nerve ring 320-372 μm and excretory pore 845-980 μm from anterior extremity; vulva 575-696 μm from posterior extremity; tail 335-380 μm long.

Discussion: *S. brasili* was described from *Leptodactylus labyrinthicus* and subsequently reported in *L. pentadactylus* of the following states in Brazil: Bahia, Mato Grosso, Minas Gereis, Sao Paulo, Para (Travassos 1927, 1931; Freitas 1959). The report herein from *Bufo paracnemis* of Paraguay is a new host record. However, only one adult worm was recovered from nine *B. paracnemis* examined, and since all other reports of atractids in frogs are from *Leptodactylus* spp., this may represent an accidental infection in an unusual host.

The genus *Schrankianella* Freitas, 1959, was distinguished from *Schrankiana* on the basis that the oesophagus of the type species differs morphologically in possessing an elongate pharyngeal portion and a corpus which is "glandular" throughout most of its length. However, examination of specimens in the present study shows that the corpus is

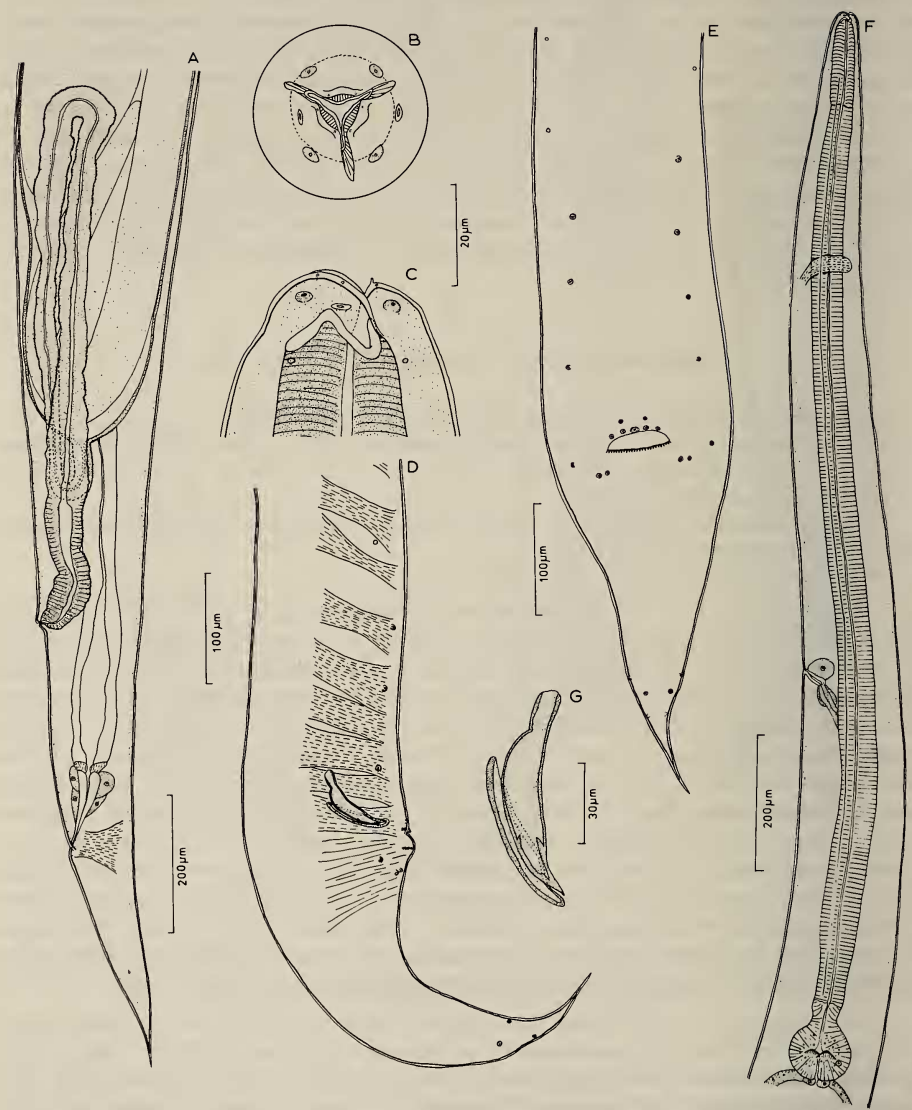

FIG. 4.

Schrankiana brasili (Travassos, 1927) Fahel, 1952. A, posterior end of female, lateral view. B, C, cephalic extremity, apical and lateral view. D, E, caudal end of male, lateral and ventral view. F, anterior end of female, lateral view. G, detail of one spicule and gubernaculum, lateral view.

typically muscular as in *Schrankiana* and most other cosmocercoids. Similarly, although the pharyngeal portion of the oesophagus is rather elongate in *S. brasili,* this character is variable among species in the genus *Schrankiana* and it is not useful for distinguishing genera. It is worth pointing out that *S. brasili* is much larger in overall body size and oesophagus length than other *Schrankiana* species. However, differences in body size are not generic characters in the Cosmocercoidea and there is considerable diversity in oesophageal shape and relative length in *Schrankiana* species other than *S. brasili.* In cephalic and male caudal features *S. brasili* is markedly similar to *Schrankiana* species indicating a close phylogenetic relationship. For these reasons *Schrankianella* is synonymized with *Schrankiana.*

Schrankiana fuscus n. sp.

Type material: MHNG 979.782 (holotype ♂) and 979.783 (allotype ♀, 2♂ and 1♂ paratype).
Host of type: *Leptodactylus fuscus* (Schneider, 1799) (MHNG field number *PY 521*).
Locality and date: arroyo Itabo Guazu (Alto Parana prov.), 5.XI.1979.
Other material: From *L. fuscus,* 2 of 6 positive, *PY 425* (1♂, 5♀).
Locality and date: Salto del Guaira (Canendiyu prov.), 31.X.1979.
Registration number: MHNG 979.784.

D e s c r i p t i o n (fig. 5): Atractidae. Similar to *S. formosula* except in following. Cephalic lips relatively short. Anterior extremity of oesophagus with three relatively large blunt tooth-like projections. Oesophagus relatively short and robust; pharynx equal in length and width and posterior bulb markedly well developed (bulb width about one quarter of total length of oesophagus).

Males (holotype, 2 paratypes): Total length 2.16 (2.08-2.11) mm; oesophagus 362 (346-358) µm long; nerve ring 140 (132-139) µm and excretory pore 254 (247-256) µm from anterior extremity; spicules 102 (103-114) µm, gubernaculum 58 (57-61) µm and tail 183 (163-171) µm long.

Females (allotype, 1 paratype): Total length 2.51 (2.33) mm; oesophagus 392 (400) µm long; nerve ring 153 (151) µm and excretory pore 288 (279) µm from anterior extremity; vulva 448 (471) µm from posterior extremity; tail 190 (204) µm long.

Other Specimens: Measurements of 1 male and 5 females are as follows:

Male — Total length 2.12 mm; oesophagus 354 µm long; nerve ring 141 µm and excretory pore 244 µm from anterior extremity; spicules 98 µm, gubernaculum 53 µm and tail 156 µm long.

Females — Total length 2.10-2.33 mm; oesophagus 384-412 µm long; nerve ring 143-173 µm and excretory pore 272-313 µm from anterior extremity; vulva 366-455 µm from posterior extremity; tail 173-193 µm long.

D i s c u s s i o n : *S. fuscus* n. sp. most closely resembles *S. larvata* in that only these two species possess a pharyngeal portion of the oesophagus which is as wide as it is long. *S. fuscus* may be differentiated from *S. larvata* in the shape of the anterior extremity of the oesophagus (terminates in three tooth-like projections which are acute in *S. larvata,* whereas in *S. fuscus* the corresponding structures are larger and blunter), position of the vulva (much farther from the posterior extremity in *S. larvata* than in *S. fuscus*), tail size in males (body length longer but tails shorter in *S. larvata* than in *S. fuscus*), and posterior termination of the lateral alae (near anus in *S. fuscus,* well anterior to anus in *S. larvata*).

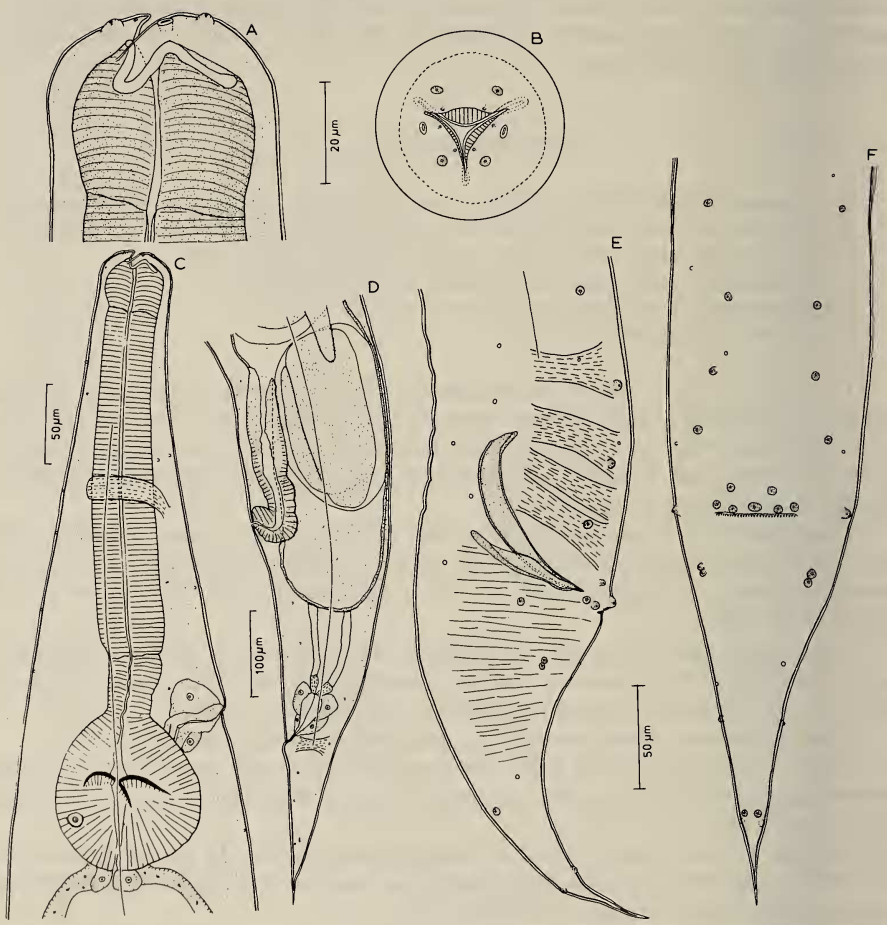

FIG. 5.

Schrankiana fuscus n. sp. A, B, cephalic extremity, lateral and apical view. C, anterior end of female, lateral view. D, posterior end of female, lateral view. E, F, caudal end of male, lateral and ventral view.

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